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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/765,009

01/26/2004

Muhammad Zubair Ikram

TI-36945

1283

23494 7590 07/09/2007
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EXAMINER

YUEN, KAN

ART UNIT

PAPER NUMBER

2616

NOTIFICATION DATE

DELIVERY MODE

07/09/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/765,009	Applicant(s) IKRAM ET AL.	
	Examiner Kan Yuen	Art Unit 2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/26/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8 and 9 is/are rejected.
- 7) ☒ Claim(s) 1-7, 10 and 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

Claim Objections

1. Claims 1-11 are objected to because of the following informalities:

In claim 1, line 4, the term "the OFDM symbol" lacks antecedent basis, because there are plurality of OFDM symbols stated in line 3, therefore its unknown which OFDM symbol the applicant is trying to refer to. Applicant's is suggested to change the term "the OFDM symbol" to "the OFDM symbols". Similar problem exist in claim 8.

In claim 1, line 4, the term "the higher SNR" has no antecedent basis. Applicant's is suggested to change the term "the higher SNR" to "a higher SNR". This is also true for the term "the correct OFDM symbol" in line 6. Applicant's is suggested to change the term "the correct OFDM symbol" to "a correct OFDM symbol".

In claim 1, lines 7 and 10, the terms "LMMSE" and "IMMSE" respectively, should be spelled out. Similar problem exist in claim 8.

In claim 2, line 2, the term "the group" has no antecedent basis. Applicant's is suggested to change the term "the group" to "a group".

In claim 9, line 4, the term "MMSE", should be spelled out.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 2616

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kadous (Pub No.: 20050088959), in view of Tang et al. (Pat No.: 7016297).

For claim 8, Kadous disclosed the method of an interference cancellation first stage operational to receive a constellation of transmitted OFDM symbols and decode the OFDM symbol having the higher SNR among the received OFDM symbols (see paragraph 0041, lines 1-20); As shown in the reference, a receiver uses a successive interference cancellation technique with a minimum mean square error detector. An

official notice is taken that decoding a higher SNR symbol in OFDM is well known in the art. However, Kadous did not disclosed the method of algorithmic software to estimate the probability that the correct OFDM symbol has been decoded; an LMMSE processing stage operational to decode the next OFDM symbol via LMMSE processing if the probability of error exceeds a predetermined threshold; and an IMMSE processing stage operational to decode the next OFDM symbol via IMMSE processing if the probability of error does not exceed the predetermined threshold. Tang et al. from the same or similar fields of endeavor teaches the method of algorithmic software to estimate the probability that the correct OFDM symbol has been decoded; an LMMSE processing stage operational to decode the next OFDM symbol via LMMSE processing if the probability of error exceeds a predetermined threshold; and an IMMSE processing stage operational to decode the next OFDM symbol via IMMSE processing if the probability of error does not exceed the predetermined threshold (see column 6, lines 45-67, and see column 7, lines 1-10). As shown, different modulation techniques are chosen based on the bit error probability of the sub-channels. Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to use the method as taught by Kadous in the network of Tang et al. The motivation for using the method as taught by Kadous in the network of Tang et al. being that it provides a well-suit modulation technique for different symbols with different SNR.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kadous (Pub No.: 20050088959), in view of Tang et al. (Pat No.: 7016297), as applied to claim 8 above, and further in view of Raleigh et al. (Pat No.: 6144711).

For claim 9, Kadous and Tang et al. disclosed all the subject matter of the claimed invention with the exception of the algorithmic software to estimate the probability that the correct OFDM symbol has been decoded is configured to estimate a function metric selected from the group consisting of additive noise variance, propagation channel matrix, and MMSE interference noise power. Raleigh et al. from the same or similar fields of endeavor teaches the method of the algorithmic software to estimate the probability that the correct OFDM symbol has been decoded is configured to estimate a function metric selected from the group consisting of additive noise variance, propagation channel matrix, and MMSE interference noise power (see column 28, lines 20-45). Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to use the method as taught by Raleigh et al. in the network of Kadous and Tang et al. The motivation for using the method as taught by Raleigh et al. in the network of Kadous and Tang et al. being that it provides an accurate estimation from a symbol's parameter such as the interference ratio of the symbol.

Allowable Subject Matter

7. Claims 1-7 would be allowable if rewritten or amended to overcome the objections, set forth in this Office action. The prior art failed to teach the method of

subtracting the contribution of decoded symbol from the received signal followed by decoding the next higher-SNR OFDM symbol via IMMSE processing if the probability of error does not exceed the predetermined threshold, as recited in claim 1.

8. Claims 10-11 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The prior art failed to teach the method for claim 10:

algorithmic software to estimate the probability that the correct OFDM symbol has been decoded is configured to estimate whether a metric defined by $P_{e1i} = \frac{e^{-|\bar{i}|/\sigma^2}}{e^{-|\bar{i}|/\sigma^2} + e^{\bar{i}/\sigma^2}}$ is greater than a predetermined threshold, wherein σ^2 is the MMSE interference noise power of the first-stage symbol, and further wherein \bar{i} represents the first-stage detected symbols prior to hard slicing.

The prior art also failed to teach for claim 11:

algorithmic software to estimate the probability that the correct OFDM symbol has been decoded is configured to estimate whether a metric defined by $P_{e1i} = \frac{e^{-|\bar{i}|/\sigma^2}}{e^{-|\bar{i}|/\sigma^2} + e^{\bar{i}/\sigma^2}}$ is not greater than a predetermined threshold, wherein σ^2 is the MMSE interference noise power of the first-stage symbol, and further wherein \bar{i} represents the first-stage detected symbols prior to hard slicing.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Onggosanusi et al. (Pub No.: 20040242179), Gray (Pub No.: 2004/0116112), and Awater et al. (Pub No.: 2005/0152317), are show systems which considered pertinent to the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kan Yuen whose telephone number is 571-270-2413. The examiner can normally be reached on Monday-Friday 10:00a.m-3:00p.m EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky O. Ngo can be reached on 571-272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ky


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SUPERVISORY PATENT EXAMINER

